Charles Darwin. A Sacrilege.

G. T. BETHUNE-BAKER, F.L.S., F.E.S.

The statue of Darwin has been removed from his place of honour on the stairs opposite the great entrance of the Natural History Museum, where he has sat for so many years—the Presiding Genius of that great Institution. Thus he has sat, the Inspirer of all the students of the Natural Sciences. Why this dethronement? We are told it is from the esthetic point of view: there are evidently two points of view on this matter. I know many think with me that the Statue, in its pure white marble, sat perfect in its surroundings; a rest to the eye, a lifter up of the soul towards greater achievement. Sir Richard Owen, whose erect dark bronze statue stands replacing that of Darwin looks dark and forbidding, quite incongruous in its surroundings, a figure to disturb, not to inspire.

It is much to be hoped that some more or less public protest be made so that this unfortunate action may be reversed.—G. T. Bethune-Baker.

Somatic Mosaics and Mutations. (*With plate III.*)

By E. A. COCKAYNE, D.M., F.R.C.P.

For some years I have been very much interested in somatic mosaics in Lepidoptera, and in previous numbers of the *Entomologist's Record* I have published lists of the known examples and discussed the different ways in which they can be produced. Others are described and three of them are figured in this paper by the courtesy of Captain H. Phillips and Captain K. F. M. Murray.

The phenomenon is a very rare one and it is seldom that anything is known of the ancestry of such a specimen, though knowledge of this is essential before any certain conclusion can be drawn as to its mode of origin. Fortunately in the first case the ancestry is known. Some time ago the late Mr. G. T. Porritt called my attention to his paper in the *Entomologist's Monthly Magazine*, 1921, p. 134, in which he described an asymmetrical specimen of *Abraxas grossulariata*, L., and later he gave me an account of the circumstances under which it was bred and sent it to me to examine. The specimen is a male, or at least no female element can be seen by examination of the antennae, wings, and external genitalia. The wings on the left side are ab. *lunulata*, Porritt., a form with little or no yellow in the band and heavily marked with black, those on the right side are aberrational, a form with a very broad yellow band and reduced black markings. The strain in which it appeared was derived from a pair of ab. *lunulata*, bred from wild larvae taken near Huddersfield, and in the first generation these gave 75 per cent. ab. *lunulata* and 25 per cent. ab. *varleyata*. After some years inbreeding this mosaic specimen arose from a cross between a *lunulata* and a *varleyata*. The strain was continued and and was still in existence four years later in 1921. In the brood in which it appeared, a fairly large one, no specimen was bred with wings at all like those on the right side of the mosaic, nor did any appear in earlier or later generations. This form has not, so far as I know, been

named, but it is not uncommon in the locality. Unfortunately its mode of inheritance is not known. On the only occasion on which Mr. Porritt tried to breed it by crossing a male and female, both of this form, only three males emerged and all were like the parents. The result does not prove whether it is dominant or recessive. If the mosaic had originated from a binucleate ovum, others entirely of the aberrational form would have been bred in the same brood and in earlier and later ones, so that this possibility can be excluded. A somatic mosaic however often arises by a mutation of recessive character in the sex chromosome, but it can only occur in the females of Lepidoptera, because in the male the presence of a second sex chromosome prevents any change in external appearance even if such a mutation happens. This explanation cannot be the true one in this case because the mosaic is a male.

Theoretically it is possible for a somatic mosaic to be produced by the loss of an autosomal chromosome, but no actual example has been proved to have originated in this way, though experimental breeding has shown that a large part of one such chromosome may be lost without a fatal result. The absence of other specimens like the aberrational side of this one precludes the possibility that this example arose in this manner.

This *grossulariata* is almost certainly a somatic mutation, but the aberration must in that case be a dominant and the mutation may have happened in any of the chromosomes. If this is the true explanation it differs from most of the other lepidopterous mosaics. (Fig. 3.)

The second specimen is a mosaic of *Epirrhoë alternata*, Müll. (*sociata*, Bork.) taken by Captain H. Phillips at Cobham on June 8th, 1906. It is a male with the wings on the right side completely black, and those on the left typical except for thin black streaks on the hindwing. No entirely melanic example of this species has, so far as I am aware, been found, though if it occurred one would expect it to have been noticed in a locality so much visited by entomologists. (Fig. 2.)

The third mosaic is a *Tephrosia punctulata*, Schiff., taken at Bracknell by Captain K. F. Murray. It seems to be a male, though it has not been examined under a microscope. The wings on the right side are typical, but the thorax, abdomen, and the left forewing are unicolorous and nearly black. The left hindwing has a black stripe running across the middle from base to termen and another black area at the anal angle, the rest being typical. Captain Murray says he has seen hundreds of *punctulata* in the same locality, but he has never seen a melanic one, nor have I any knowledge of the occurrence of such a melanic form elsewhere. (Fig. 1.)

These specimens are interesting because they are males and in neither case is a melanic form like the aberrational parts of them known. These two facts make it improbable that they are derived from binucleate ova, and impossible that they are somatic mutations of recessive type. They are most likely somatic mutations, but if so the melanic forms must be dominants. In any case we shall probably find both these melanic forms sooner or later and their mode of inheritance can then be worked out and the nature of these remarkable somatic mosaics made clear.

The fourth mosaic is a female of *Spilosoma lubricipeda*. The wings on the left side are more unspotted both on the upper and under side

surfaces than most typical specimens, but those on the right are ab. *intermedia*, the radiation of both surfaces of the hindwing being particularly intense. The specimen was found on an out-house on June 14th, 1907, and had almost certainly escaped from the inside where a brood from Theddlethorpe was emerging. In this brood more extreme radiated forms as well as almost typical ones appeared. The specimen sold at Stevens' Auction Rooms, February 2nd, 1926, is now in Mr. Robert Adkin's collection. The fact that individuals, some like one side of the mosaic and others like the other side, were present in the brood makes it probable that it arose from a binucleate ovum. Federley has shown that radiation in *lubricipeda* is due to multiple factors and radiation of this degree seems to be due to more than one. This is an additional fact in favour of the hypothesis advanced above, because two or more mutations are much less likely to occur simultaneously than a single one.

At the Annual Exhibition of the South London Entomological Society in 1927, Mr. Castle-Russell showed a mosaic, a female of *Agriades coridon*, Rott., with the wings on the left side typical and almost devoid of blue scales on the upper surface, but with those on the right side ab. *semisyngrapha*, Tutt.

In my first paper I mentioned a specimen of *Colias croceus* with the wings typical on one side and ab. *helice* on the other shown by Mrs. Hemming. I have seen the specimen since and, though I had no opportunity to examine it microscopically, I think the white colour of the one side is due to a defect of the scales. The *C. philodice* recorded in *Psyche* is probably similar, and if so neither are true mosaics. On the other hand in Lord Rothschild's collection there is a female of *croceus*, which is undoubtedly a mosaic with one side typical and the other ab. *helice*.

In Mr. Porritt's paper reference is made to *grossulariata* with three wings ab. *nigrosparsata*, Raynor, and the fourth almost entirely typical, and to one with three wings ab. *nigra*, Raynor, and the fourth irregularly streaked with white, and I have seen a specimen with part of one hind-wing like ab. *varleyata* and the rest of the insect normal. There is also a record of a specimen with the left forewing almost black, presumably ab. *nigra*, and the other three wings normal (*Proc. Ent. Soc. Lond.* 1881. p. x.). Another mosaic of this kind is the *Papilio polyxenes* r. *asterius* with the underside of one hind-wing ab. *calverleyi*, Grote, recorded in the *Proc. South. Lond. Ent. Soc.* 1922-1923, p. 60. The much greater frequency with which in *Drosophila* only a small area shows the mutation than approximately half the insect, makes it probable that these are true somatic mutations.

Blaringhem describes a larva of *Bombyx mori* with the left side of the dominant zebra form, (ver rayé) and the right side of the recessive white form. It was the only somatic mosaic amongst 1,200,000 larvae bred in 1913. He states that in 1902 M. Coutagne among larvae from a cross between a white and a dark form (ver moricaud) there were three showing a mosaic of the two forms, none of which lived. These might have been gynandromorphs, but the phenomenon of a mosaic of colour unrelated to sex is well-known to silkworm breeders, though it is very rare.

Earlier in this paper I said that no wholly melanic form of *punc-*

tulata or *alternata* like the mutational part of either mosaic was known to me. It is even possible that none exists. It may be thought improbable that forms unknown hitherto should arise as mutations in a somatic rather than in a germ cell, but proof that they can do so has been given by Mohr, who found that a sex-linked recessive character, differing from any previously met with, appeared in this way in a specimen of *Drosophila melanogaster*, the ancestry of which was well-known. About half the insect showed the new mutation and it reappeared in the males of the second generation.

Offspring of other somatic mutations of *Drosophila* have been bred. Sturtevant records two *D. melanogaster*, each having one eye in part like the rest of the insect and in part like a well-known mutation. The mutant character was not inherited in either instance. Hyde also records two somatic mutations in which the eye was affected, the species being *D. hydei*. The first gave only one offspring like the major part of the insect, but the second, which arose between a typical male and a scarlet female, proved to be heterozygous for the recessive character that appeared in the eye and for the typical coloration.

In Coleoptera there are a number of records of mosaics taken wild; Chatanay, for example, mentions a *Zonabris variabilis* with the left elytron like a variety of *variabilis* and the other totally different and like a variety of *Z. praeusta*. Most of our knowledge of mosaics in this order is due to the researches of Breitenbecher, who was investigating the genetical relationships of the various elytral colours in *Bruchus quadrimaculatus*, F. In the course of his experiments he met with 48 mosaics, all females, and offspring were obtained from 31 of them. In every case the mutation was a dominant and the progeny were all like the side with the recessive coloration. All the mutations occurred in autosomal chromosomes, and, if I am right, they are very similar to the three Lepidopterous mosaics described at the beginning of this paper.

In Hymenoptera, Whiting has investigated many mosaics in the parasitic wasps, *Habrobracon juglandis*, Ashmead, and *H. brevicornis*. Males in this genus usually arise from unfertilized eggs, but may arise from fertilized ones. Mosaic males were produced regularly but in varying proportions from the cross between a dominant black male with a recessive orange female, but much more rarely from the reverse cross. Most of these male mosaics were sterile, but when fertile they transmitted with one exception characters derived from the male parent only, or from the female parent only. The one exception transmitted characters derived from both parents. In addition to these mosaics five were from fertilized eggs. The mosaics in *Habrobracon* differ in origin from those in Lepidoptera and Coleoptera, and the causes are discussed very fully by Whiting to whose papers I give references.

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Noctuae and Vars. in 1927.

By A. J. WIGHTMAN, F.E.S.

The season 1927 appears to have been a good one for lepidoptera although I fully expect the continual rain has prevented many lepidopterists from doing much field work.

Being on the spot I was able to do a certain amount of collecting on all but the worst nights, and the following list of species taken within the county of Sussex between March 11th and October 21st could have been considerably increased had I been minded to go further afield for other species rather than work for forms.

Acronicta leporina, *A. aceris*, *A. megacephala*, *A. tridens* (larvae), *A. psi*, *Craniophora ligustri*, *Metachrostis perla*, *Agrotis segetum*, *A. corticea*, *A. cinerea*, *A. puta*, *A. tritici*, *A. exclamationis*, *A. ypsilon* (*suffusa*), *A. strigula*, *Noctua augur*, *N. glareosa*, *N. castanea* (larvae), *N. baia*, *N. c-nigrum*, *N. triangulum*, *N. brunnea*, *N. primulae* (*festiva*), *N. rubi*, *N. umbrosa*, *N. xanthographa*, *N. plecta*, *Axylia putris*, *Triphaena comes*, *T. pronuba*, *T. fimbria*. *T. janthina*, *T. interjecta*, *Aplecta prasina*, *A. nebulosa*, *Mamestra brassicae*, *M. persicariae*, *Hadena oleracea*, *H. genistae*, *H. thalassina*, *H. pisi*, *H. nana* (*dentina*), *Dianthoecia conspersa* (larvae), *D. capsincola* (larvae), *D. cucubali* (larvae), *D. carpophaga* (larvae), *Hecatera serena* (larvae), *Neuria reticulata*, *Neuronia popularis*, *Luperina cespitis*, *Eremobia ochroleuca* (larvae), *Luperina testacea*, *Cerigo matura*, *Mamestra abjecta*, *M. sordida*, *Apamea gemina*, *A. basilinea*, *A. unanimis* (larva), *A. secalis* (*didyma*), *Miana strigilis*, *M. fasciuncula*, *M. literosa*, *M. bicoloria*, *Xylophasia rurea*, *X. lithoxylea*, *X. sublustris*, *X. monoglypha*, *X. hepatica*, *Dipterygia scabriuscula*, *Aporophyla lutulenta* (larvae), *Miselia oxyacanthae*, *Agriopis aprilina*, *Euplexia lucipara*, *Phlogophora meticulosa*, *Hydraecia nictitans*, *H. micacea*, *Gortyna ochracea*, *Mania maura*, *Nonagria sparganii* (pupae), *N. typhae* (pupae), *N. geminipuncta* (pupae), *Coenobia rufa*, *Senta maritima* (larvae), *Tapinostola fulva*, *Calamia lutosa*, *Leucania phragmitidis* (larvae), *L. obsolcta* (pupae), *L. impudens* (larvae), *L. pallens*, *L. impura*, *L. straminea* (larvae), *L. comma*, *L. litharyyria*, *L. conigera*, *Grammesia trigrammica*, *Caradrina morpheus*, *C. taraxaci*, *C. quadripunctata*, *Petilampa arcuosa*, *Rusina tenebrosa*, *Amphipyra pyramidea*, *Panolis griseo-variegata* (*piniperda*), *Pachnobia rubricosa*, *Taeniocampa gothica*, *T. miniosa*, *T. pulverulenta*, *T. stabilis*, *T. incerta*, *T. munda*, *T. gracilis*, *Calymnia pyralina*, *C. diffinis*, *C. trapezina*, *Dyschorista fissipuncta* (*ypsilon*), *Omphaloscelis lunosa*, *Amathes lota*, *A. macilenta*, *A. circellaris*, *A. lychnidis* (*pistacina*), *Cirrhia citrago*, *Ochria aurago*, *Xanthia lutea* (*flavago*), *X. fulvago*, *Xantholeuca croceago*, *Orrhodia vaccinii*, *O. ligula* (*spadicea*), *Scopolosoma satellitia*, *Xylina semibrunnea*, *X. socia*, *X. ornithopus*, *Xylocampa areola*, *Calocampa vetusta*, *Cucullia verbasci* (larvae), *C. scrophulariae* (larvae), *C. asteris* (larvae), *C. gnaphalii* (larvae), *C. chamomillae* (larvae), *C. umbratica* (larvae), *Anarta myrtilli* (larvae), *Erastria fasciana*, *Hydrelia uncula*, *Gonoptera libatrix*, *Habrostola*